

AMENDMENTS TO THE CLAIMS

The following Listing of Claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently amended) A method for enabling the creation and management of a platform-independent application whose appearance and functionality is consistently propagated across heterogeneous device types for cross-device interoperability, replicability, and compatibility of applications and data with a consistent user experience, the method comprising:

receiving, by a device comprising a processor and a memory element, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing an application state, program code and internal logic of the application;

instantiating, by a superstructure-dedicated operating system, the application in the device in accordance with the received platform-independent data superstructure;

storing, by the memory element, the instantiated application;

receiving, by the platform-independent data superstructure, from a device-native operating system via communication with the superstructure-dedicated operating system, at least one application event generated by an execution of the instantiated application and representative of an update to the application state of the application;

updating, by the platform-independent data superstructure, information in a first segment of the platform-independent data superstructure associated with the at least one application event, responsive to receiving the at least one application event and independent of an update to a second segment in the platform-independent data superstructure; and

updating, in accordance with the superstructure segment update, the application state of the executing application on the device, ~~wherein updating information in the segment of the superstructure further comprises:~~

—~~receiving data representative of the at least one application event in the superstructure dedicated operating system; and~~
—~~applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure.~~

2. (Canceled).

3. (Previously presented) The method of claim 1 further comprising:

receiving, by the device, a message containing a data object of a defined type operable to instantiate the application in the device; and

executing the instantiated application on the device in accordance with the data object in the received message.

4. (Previously presented) The method of claim 1 further comprising instantiating the application substantially when the application is invoked.

5. (Previously presented) The method of claim 1 further comprising instantiating the application at an application-provisioning time prior to application run-time.

6. (Previously presented) The method of claim 1 further comprising:

identifying, by a provisioning application on a first device within an operating environment on the first device, a first superstructure for generating a new application superstructure on a second device;

generating, by the provisioning application, a data object for generating the new application superstructure on the second device;

transmitting, to the second device, the data object; and

generating, by the second device, the new application superstructure responsive to the received data object.

7. (Previously presented) The method of claim 1 further comprising:

identifying, by a provisioning application on a first device within an operating environment on the first device, a predefined data object that expresses a new application superstructure for a second device;

transmitting, to the second device, the predefined data object; and

creating, by the second device, the new application superstructure, responsive to the received predefined data object.

8. (Previously presented) The method of claim 1 further comprising:

maintaining, by a first device, an application accepting input from a user to create an interactive message;

translating, by the first application, a portion of the message into a new superstructure-based application operable to perform at least one of displaying the message and causing interactive operations within the message; and

transmitting, by the first application, the superstructure of the new application to a second device.

9. (Previously presented) The method of claim 8 further comprising:

converting the superstructure into a temporary form that is transmitted, received, and decoded back into an original form on the second device; and

maintaining, by the second device, an application that receives the superstructure in its temporary form, decodes it, and causes the message-bearing superstructure to operate, thereby rendering the message.

10. (Previously presented) The method of claim 1, wherein receiving the platform-independent data superstructure further comprises receiving, by the device, for a given state of a selected application, a platform-independent data superstructure having a substantially invariant organization, regardless of the device, platform or device-native operating system environment in which the associated application is instantiated, so as to maintain a consistent application

appearance and behavior across a plurality of heterogeneous devices, platforms and device-native operating system environments.

11. (Previously presented) The method of claim 1, wherein the step of receiving further comprises receiving, by the device, a platform-independent data superstructure defining a plurality of rules of appearance and behavior of the application, which are substantially invariant across a plurality of heterogeneous devices, platforms and device-native operating system environments.

12. (Previously presented) The method of claim 1, wherein the step of receiving further comprises receiving, by the device, substantially identical application source code in the platform-independent data superstructure as source code used across a plurality of heterogeneous devices, platforms and device-native operating system environments.

13. (Previously presented) The method of claim 1 further comprising instantiating, by the superstructure-dedicated operating system, an application including a user interface having a substantially identical appearance and behavior across a plurality of heterogeneous devices, platforms and device-native operating system environments.

14. (Canceled).

15. (Previously presented) The method of claim 1 further comprising the steps of:
generating, by the superstructure-dedicated operating system a modification data object representative of a modification applied to the superstructure;
translating the modification data object into a form suitable for processing by the device-native operating system;
receiving in the device-native operating system the translated modification data object;
and
processing the translated modification data object in the application to update the application state of the executing application.

16. (Original) The method of claim 15 further comprising expressing within the superstructure a mechanism for generating the modification data object.

17. (Currently amended) The method of claim 1, wherein updating information in the segment of the superstructure further comprises:

receiving data representative of the at least one application event in the superstructure-dedicated operating system;

applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure, wherein modifying the superstructure further comprises

transmitting a portion of the superstructure to a processor remote from the device, modifying the transmitted portion, and then returning at least one of the modified portion and a new set of operations to update the superstructure.

18. (Currently amended) The method of claim 1, wherein updating information in the segment of the superstructure further comprises:

receiving data representative of the at least one application event in the superstructure-dedicated operating system;

applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure, wherein modifying the superstructure further comprises using device-native code to implement an interface to modify the superstructure.

19. (Currently amended) The method of claim 1, wherein updating information in the segment of the superstructure further comprises:

receiving data representative of the at least one application event in the superstructure-dedicated operating system;

applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure, wherein the application of changes to the superstructure is implemented by activating program instructions within the superstructure.

20. (Previously presented) The method of claim 1 further comprising:

storing, by an application server in communication with the device, a copy of the platform-independent data superstructure, the superstructure including at least one data object operable to instantiate applications on the device; and

transmitting an application from the application server to the device by replicating data objects in the superstructure to the device, so as to enable instantiation of new data objects and of the application on the device.

21. (Currently amended) A method for enabling the creation and management of a platform-independent application whose appearance and functionality is consistently propagated across heterogeneous device types for cross-device interoperability, replicability, and compatibility of applications and data with a consistent user experience, the method comprising:

receiving, by a device comprising a processor and a memory element, a platform-independent data superstructure defining the appearance and behavior of an application, the superstructure storing an application state, program code and internal logic of the application;

instantiating, by a superstructure-dedicated operating system, the application in the device in accordance with the received platform-independent data superstructure;

storing, by the memory element, the instantiated application;

transmitting, to the superstructure-dedicated operating system, by a device-native operating system, at least one application event generated by an execution of the instantiated application and representative of an update to the application state of the application;

transmitting, by the superstructure-dedicated operating system, to a remote server, a segment of the superstructure associated with the at least one application event;

receiving, from the server, a modified version of the segment of the superstructure generated responsive to the received segment of the platform-independent data superstructure for replacement of the existing version of the segment of the superstructure, thus updating the segment of the platform-independent data superstructure; and

instructing, by the superstructure-dedicated operating system, the device-native operating system to update the application state of the executing application, in response to the updated segment of the superstructure, ~~wherein updating the segment of the superstructure further comprises:~~

~~receiving data representative of the at least one application event in the superstructure dedicated operating system; and~~

~~applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure.~~

22. (Previously presented) The method of claim 21 further comprises servicing, by a plurality of heterogeneous devices, communications channels and communications providers, the communications channels, wherein the platform-independent data superstructure defines a given application to have an appearance and behavior that can be propagated with consistency across heterogeneous devices, communications channels and communications providers.

23. (Previously presented) The method of claim 21 further comprising:

modifying the platform-independent data superstructure in a substantially device-independent manner; and

expressing a real-time image of an application executing in a first device across the network from the first device to a second device to yield a viable instantiation of the application in the second device, regardless of device environment.

24. (Previously presented) The method of claim 21, further comprising:

expressing, by the platform-independent data superstructure, a running application state and functionality of an application operating in a first device; and

instantiating the application on a second device, without loss of application state or functionality, by expressing the platform-independent data superstructure on the second device.

25. (Original) The method of claim 1 further comprising validating the superstructure upon or after modification.

26. (Previously presented) The method of claim 1 further comprising validating the platform-independent data superstructure after modifying the platform-independent data superstructure, the validation including validation of data updated by processing of an event, so that the modified platform-independent data superstructure cannot express a harmful change to the device-native operating system.

27. (Previously presented) The method of claim 1 further comprising producing, by an application defined by the platform-independent data superstructure, external changes only by invoking operations that operate on the superstructure.

28. (Previously presented) The method of claim 1 further comprising providing an interface between an application and a system service, wherein the interface is defined by interaction between the platform-independent data superstructure and the superstructure-dedicated operating system.

29. (Previously presented) The method of claims 1 or 21 further comprising:
expressing, by an information processing language adapted to interface with the platform-independent data superstructure, a set of transformations within the platform-independent data superstructure, the information processing language being expressible entirely within the platform-independent data superstructure and capable of expressing a set of transformations within the platform-independent data superstructure; and

modifying, by the information processing language, data only within the platform-independent data superstructure, so that applications utilizing the language cannot affect the state of other applications or operate outside a bounded application container to affect an underlying device platform.

30. (Previously presented) The method of claim 1, wherein the platform-independent data superstructure contains at least one stylesheet for defining selected application or presentation characteristics.

31. (Original) The method of claim 30 further comprising configuring stylesheets on a per-device basis.

32. (Original) The method of claim 30 further comprising configuring stylesheets on a per-group-of-devices basis.

33. (Original) The method of claim 30 further comprising expressing stylesheets within the superstructure, independent of device-specific limitations.

34. (Original) The method of claim 30 further comprising selecting a stylesheet at runtime.

35. (Previously presented) The method of claim 1 further comprising the step of transmitting an application defined by the platform-independent data superstructure via a peer-to-peer transaction from a first device in which the application is instantiated, to a second device for instantiation in the second device.

36. (Previously presented) The method of claim 1 further comprising:

converting at least a portion of the platform-independent data superstructure into a device-portable form, independent of the present state of the application; and

reconstructing the original superstructure portion, on the same or different device context, using the device-portable form, without loss of state.

37. (Previously presented) The method of claim 36, wherein the reconstructing includes utilizing a new device-specific stylesheet.

38. (Currently amended) A system for enabling the creation and management of a platform-independent application whose appearance and functionality is consistently propagated across heterogeneous device types for cross-device interoperability, replicability, and compatibility of applications and data with a consistent user experience, comprising:

a device comprising a processor and a memory element;

a platform-independent data superstructure received by the device, defining the appearance and behavior of an application and storing an application state, program code and internal logic of the application, and receiving at least one application event generated by an

execution of an instantiation of the application and representative of an application state of the executing application;

a superstructure-dedicated operating system in communication with a device-native operating system i) executing the instantiation of the application in the device in accordance with the platform-independent data superstructure, ii) directing the updating of information stored in at least one segment of the platform-independent data superstructure associated with the at least one application event responsive to receiving the at least one application event and independent of an update to a second segment in the platform-independent data superstructure, the information including application state, and iii) directing the modification, in accordance with the superstructure segment update, of the application state of the executing application, ~~wherein updating information in the segment of the superstructure further comprises:~~

~~receiving data representative of the at least one application event in the superstructure dedicated operating system; and~~

~~applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure.~~

39. (Previously presented) The method of claim 36 further comprising:

using the device-portable form as an intermediate or permanent storage format for recording data within the platform-independent data superstructure.

40. (Previously presented) The method of any of claims 1 or 21, wherein the superstructure is organized into objects and classes.

41. (Previously presented) The system of claim 38, wherein the platform-independent data superstructure further comprises at least one data structure that may be interpolated when the device-native operating system requests data from the platform-independent data superstructure.

42. (Previously presented) The method of claim 3, wherein a first device can transmit to a second device a message containing an application event item, causing the second device to place the application event item into a processing queue of the second device.

43. (Previously presented) The method of claim 20, wherein application logic can be distributed across the network by obtaining a portion of the application logic from the device and transmitting it in a hierarchical form to the server without the necessity of adapting code therefor.

44. (Previously presented) The method of claim 20 further comprising providing updates to an application state from the server to a remote device, by defining a minimal change set to the application state and transferring it across the network from the server to the remote device, without the necessity of adapting code therefor.

45. (Previously presented) The method of claim 1 further comprising incorporating media assets into the platform-independent data superstructure, for reference by executing applications.

46. (Previously presented) The method of claim 1 further comprising incorporating by reference media assets outside the platform-independent data superstructure, for reference by executing applications.

47. (Previously presented) The method of claim 1, wherein the step of receiving further comprises receiving, by a wireless messaging device operable to communicate with a network serviced by a communications carrier, the platform-independent data superstructure enabling the creation, modification, and management of platform-independent user interfaces and associated display elements for an application having an appearance and behavior propagated with consistency across a network of heterogeneous platforms and communications carrier protocols, the platform-independent data superstructure defining a user interface, maintaining a display state of the user interface and storing an application state, program code and internal logic of the application

48. (Previously presented) The method of claim 47 further comprising the step of updating, in accordance with a superstructure segment update, the application state and the user interface state on the wireless messaging device.

49. (Canceled).

50. (Previously presented) The method of claim 47 further comprising the step of updating, in response to generated application events, a first segment of the platform-independent data superstructure associated with the application events independent of an update to a second segment in the platform-independent data superstructure, the application events including associated user interface events.

51. (Canceled).

52. (Previously presented) The method of claim 47, wherein the application includes a user interface, and wherein the user interface has a substantially identical appearance and behavior across heterogeneous devices, platforms or device-native operating system environments.

53. – 69. (Canceled).

70. (Previously presented) The method of claim 47 further comprising the step of requesting, by at least one application event, a modification to the user interface.

71. (Previously presented) The method of claim 47 further comprising the step of requesting, by the at least one application event, access to at least one template element stored in a library of platform-independent user interface templates provided by the platform-independent data superstructure.

72. (Previously presented) The method of claim 71, further comprising the step of requesting, by the at least one application event, at least one of an addition, subtraction, replacement or other modification, to the at least one template element stored in a library of platform-independent user interface templates.

73. (Previously presented) The method of claim 47, further comprising the step of requesting, by the at least one application event, an addition of user-defined content into the user interface.

74. (Canceled).

75. (Previously presented) The method of claim 71 further comprising the step of enabling the creation of templates at a remote processor for subsequent representation in the platform-independent data superstructure and instantiation in the wireless device.

76. (Original) The method of claim 75 wherein the remote processor is a personal computer.

77. (Original) The method of claim 47, further comprising configuring the user interface to respond to controls adapted to be actuated by a user's thumbs.

78. (Original) The method of claim 47 further comprising configuring the user interface to provide visual, sonic, tactile or other human-perceptible indications in response to commands entered by a user, or other application events.

79. (Original) The method of claim 47 further comprising configuring the user interface to enable a user to view, generate, send and manage messages.

80. (Original) The method of claim 79 further comprising configuring the user interface to enable a user to generate messages containing any of text, images, sound, or other media content.

81. (Previously presented) The method of claim 1 further comprising the steps of receiving, by the device, via a wireless communications channel accessible by a superstructure-based application environment, an application update, the application update including a data object operable to update a first segment of a platform-independent data superstructure in the superstructure-based application environment, independent of an update to a second segment in the platform-independent data superstructure; and

receiving, by the device, a command to update the state of the executing application in accordance with the application update.

82. (Previously presented) The method of claim 81 further comprising receiving, by a plurality of devices, a broadcasted application update and command to update a state of an executing application.

83. (Previously presented) The method of claim 1 further comprising the step of:
transmitting, by the device, to a plurality of devices in a network, via a wireless
communications channel, at least one update;
transmitting, by the device, to the plurality of devices in the network, a command to
update, in the plurality of devices, a state of an executing application in accordance with
received update.

84. (Previously presented) The method of claim 83, wherein the step of transmitting
the at least one update further comprises transmitting, by the device, to a plurality of devices in
the network, via a wireless communications channel, at least one update to a state of an
executing application.

85. (Original) The method of any of claims 82, 83 or 84 further comprising: ensuring
that each device is in a consistent, known state at the time of broadcasting and that the update
remains whole and complete.

86. (Original) The method of any of claims 82, 83 or 84 further comprising:
broadcasting, in an all-or-nothing manner, only complete segments of application update.

87. (Previously presented) The method of claim 1, further comprising the step of:
using an internal representation of the platform-independent data superstructure to store
private data relating to requests from the application or the state or data type of a superstructure
node, wherein the private data is not serialized when the application is paused, halted or
migrated, and is stored in a manner conveniently accessible at application runtime, such that this
non-conversational data is coherently recoverable so long as the private data can be re-
established upon de-serialization, based on public data that has been maintained in the platform-
independent data superstructure.

88. (Canceled).

89. (Previously presented) The method of claim 1, further comprising the step of:
instantiating the platform-independent data superstructure in the device.

90. (Canceled).

91. (Currently amended) A system for enabling the creation and management of a platform-independent application whose appearance and functionality is consistently propagated across heterogeneous device types for cross-device interoperability, replicability, and compatibility of applications and data with a consistent user experience, comprising:

means for receiving, by a device comprising a processor and a memory element, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing an application state, program code and internal logic of the application;

means for instantiating, by a superstructure-dedicated operating system, the superstructure;

means for storing, by the memory element, the instantiated application;

means for receiving, by the platform-independent data superstructure, from a device-native operating system via communication with the superstructure-dedicated operating system, at least one application event generated by an execution of the instantiated application and representative of an update to the application state of the application;

means for updating, by the platform-independent data superstructure, information in a first segment of the platform-independent data superstructure associated with the at least one application event, responsive to receiving the at least one application event and independent of an update to a second segment in the platform-independent data superstructure; and

means for updating, in accordance with the superstructure segment update, the application state of the executing application on the device, ~~wherein updating information in the segment of the superstructure further comprises:~~

~~receiving data representative of the at least one application event in the superstructure dedicated operating system; and~~

~~applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure.~~

92. (Previously presented) The system of claim 91, wherein the means for receiving the platform-independent data superstructure further comprises

means for receiving, by the device, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing an application state, program code and internal logic of the application, and comprising a hierarchical information structure.

93. (Previously presented) The system of claim 91 further comprising means for instantiating the application in the device in accordance with the platform-independent data superstructure.

94. (Previously presented) The system of claim 91 wherein the means for receiving further comprises means for receiving, by the device, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing an application state, program code and internal logic of the application, and comprising an Extensible Markup Language (XML) information superstructure.

95. (Previously presented) The method of claim 1, wherein the step of receiving the platform-independent data superstructure further comprises receiving, by the device, a platform-independent Extensible Markup Language (XML) information superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing state, program code and internal logic of the application.

96. (Previously presented) The method of claim 1, wherein the step of receiving the platform-independent data superstructure further comprises receiving, by the device, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure serializable in whole or in part at any time and storing state, program code and internal logic of the application.

97. (Previously presented) The method of claim 1 further comprising the step of encapsulating, by the platform-independent data superstructure, program code defining appearance and behavior of the application.

98. (Previously presented) The method of claim 1, wherein the step of receiving the platform-independent data superstructure further comprises receiving, by the device, a platform-independent data superstructure comprising at least one data structure that may be interpolated when the device-native operating system requests data from the platform-independent data superstructure.

99. (Previously presented) The method of claim 21, wherein the step of receiving the platform-independent data superstructure further comprises receiving, by the device, a platform-independent Extensible Markup Language (XML) information superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing state, program code and internal logic of the application.

100. (Previously presented) The method of claim 21, wherein the step of receiving the platform-independent data superstructure further comprises receiving, by the device, a platform-independent hierarchical information superstructure defining the appearance and behavior of an application, the platform-independent data superstructure storing state, program code and internal logic of the application.

101. (Previously presented) The method of claim 21 further comprising the step of encapsulating, by the platform-independent data superstructure, program code defining appearance and behavior of the application.

102. (Previously presented) The method of claim 21, wherein the step of receiving the superstructure further comprises receiving, by the device, a platform-independent data superstructure defining the appearance and behavior of an application, the platform-independent data superstructure serializable in whole or in part at any time and storing state, program code and internal logic of the application.

103. (Previously presented) The method of claim 21, wherein the step of receiving the superstructure further comprises receiving, by the device, a platform-independent data

superstructure comprising at least one data structure that may be interpolated when the device-native operating system requests data from the platform-independent data superstructure.

104. (Previously presented) The system of claim 38, wherein the platform-independent data superstructure further comprises a platform-independent Extensible Markup Language (XML) information superstructure.

105. (Previously presented) The system of claim 38, wherein the platform-independent data superstructure further comprises a platform-independent hierarchical information superstructure.

106. (Previously presented) The system of claim 38, wherein the platform-independent data superstructure encapsulates program code defining appearance and behavior of the application.

107. (Previously presented) The system of claim 38, wherein the platform-independent data superstructure is serializable in whole or in part at any time.

108. (Previously presented) The system of claim 91, wherein the means for receiving further comprises means for receiving, by a device, a platform-independent Extensible Markup Language (XML) information superstructure.

109. (New) The method of claim 1, wherein updating information in the segment of the superstructure further comprises:

receiving data representative of the at least one application event in the superstructure-dedicated operating system; and

applying to the superstructure, in response to the received data, a data object, thereby modifying the superstructure.